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Monthly Broadcasts of Climatological Data

At the International Meteorological Conference at Copenhagen in 1929 Prof. A. Wagner proposed that monthly mean values for selected stations should be broadcast as promptly as possible by wireless telegraphy. After considerable discussion the arrangements were completed and ratified at the Conference at Warsaw in 1935. They provided for the broadcasting of mean pressure in millibars (in low latitudes millibars and tenths), mean temperature in degrees and tenths, total precipitation in centimetres and for certain stations resultant air transport for the month. The issues would be in two stages: national broadcasts of a fairly close network of stations as early as possible and at latest on the 5th of the following month, and inter-continental broadcasts of a selection of these, to follow as speedily as possible. For comparison normals were to be circulated, as far as possible for the period 1901 to 1930, which has been adopted as the standard for climatological purposes.

The first group of these broadcast climatological messages were issued from a number of European countries in June 1936, giving the data for May, and these were used in preparing the summary of "The Weather of May 1936" in the *Meteorological Magazine*. The number of issues gradually grew; data for Russia and Siberia were broadcast in September and in March 1937 figures for a number of stations in Canada and the United States were received for the first time. Some of the stations are in the most remote regions of both Asia and America.

* For Indian stations a rain day is a day on which 0·1 in. or more rain has fallen.

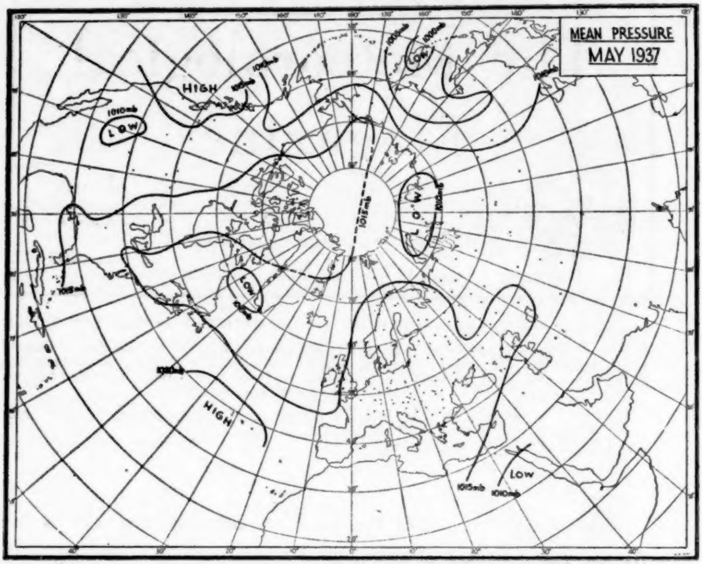

MEAN PRESSURE
MAY 1937
HIGH
LOW
1010mb
1015mb
HIGH
LOW
1010mb
1015mb
LOW

Fig. 1


PRESSURE DEVIATIONS
MAY 1937
0mb
ABOVE
NORMAL
BELOW
NORMAL
0mb
+25mb
+25mb
0mb
0mb

Fig. 2

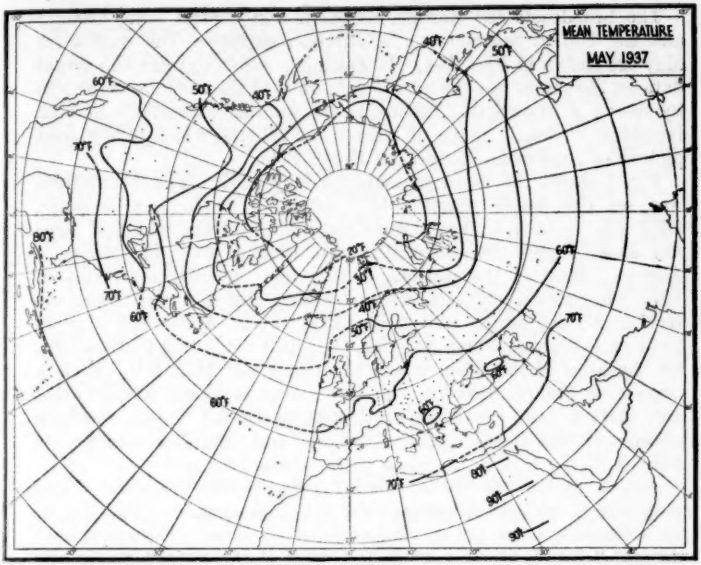

MEAN TEMPERATURE
MAY 1937

FIG. 3

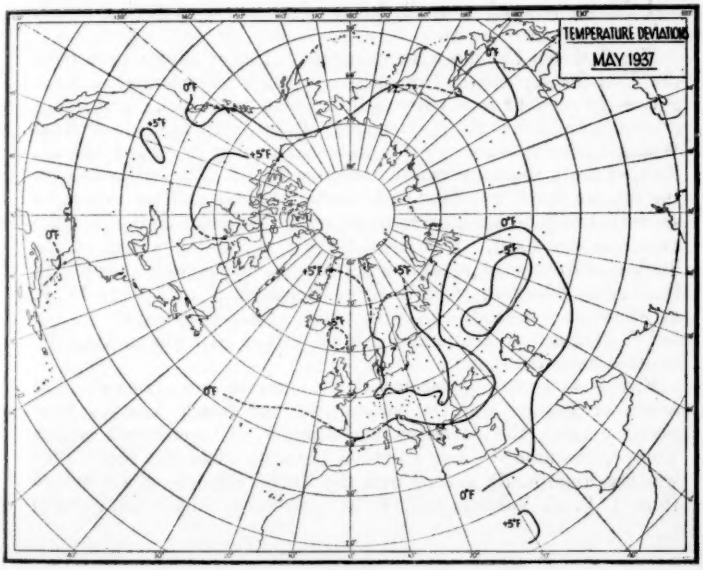

TEMPERATURE DEVIATIONS
MAY 1937

FIG. 4

The broadcasts for Europe, northern and central Asia, Canada and the United States are now almost complete. The results for May are shown in Figs. 1–4. It was not possible to print the actual data on the maps, but the positions of most of the stations are shown by dots. A remarkable feature is the number of stations in high latitudes, especially north of Russia and Siberia, which give a good picture of conditions around the North Pole.

Fig. 1 shows the mean pressure for May 1937. The distribution was on the whole remarkably uniform. The highest pressure, 1023 mb., occurs in the Azores anticyclone, from which a large flat area of pressure above 1015 mb. extends over the whole of Europe. Most of the stations in this area reported a pressure of 1017 mb. Relatively high pressure occurs also in a ridge from the Gulf of Mexico across the Great Lakes to the Arctic and also off the Pacific coast of North America, the latter extending to Honolulu, off the area of the map, where the mean was 1018 mb. A deep depression (below 1000 mb.) is shown over southern Kamschatka, and shallow lows over the south-western United States, southern Greenland, the Arctic coast of Siberia and the Nile valley; at Juba in 5° N., 31½° E. the mean pressure was 1002 mb.

Fig. 2 shows the deviations of pressure from normal. This map also is rather featureless, and it is less complete than Fig. 1, as normals are not yet available for all stations. Europe was in general 2–3 mb. above normal and most of the United States and southern Canada 1–2 mb. above normal while the Arctic regions and Siberia showed a small deficit of pressure, exceeding 5 mb. only in three small areas.

Fig. 3 shows the mean temperature. This is constructed from the data for stations at low altitudes (below 800 metres) and the figures have not been corrected to mean sea level. The range extends from below 20° F. over most of the Arctic Ocean (14° F. at Wrangel Island) to above 90° F. in the Nile valley (94° F. at Aswan). Further south the temperature decreases again. The isotherms over the sea are based on island and coastal stations and are broken to show that they do not necessarily represent the mean air temperature over the sea itself. The characteristic northward swing of the isotherms from west to east over the Atlantic is well shown. In the British Isles temperatures ranged from 56° F. at Kew to 49° F. at Aberdeen; a small area with temperatures between 49° F. and 50° F. over eastern Scotland and the Shetland Isles was accidentally omitted from the map.

Fig. 4 shows the deviations of temperature from normal. The whole of Europe and the greater part of North America were above normal, the deviation exceeding 5° F. over north-eastern Europe, Scandinavia and northern Canada, while the Nile valley was also abnormally warm; over the British Isles the excess ranged from 1° F. at Valentia to 3° F. at Stornoway. The main areas of

deficient temperature included western Siberia and the northern Pacific coasts of America and Asia.

It was not possible to show the rainfall data cartographically. Over most of Europe the rainfall was 2–3 in., rising to 4 in. or more locally in central Europe, the Balkans and the Caucasus region, the greatest rainfall reported being 22 cm. (9 in.) at Sofia, 14 cm. (nearly 6 in.) above normal. In America the rainfall was generally about two inches but was heavy in the south-east, reaching 24 cm. (nearly 10 in.) at Key West, Florida, where it was 6 in. above normal. Elsewhere the abnormalities were not great; the western plains of the United States were generally dry, but over Europe and Asia the distribution was irregular.

In spite of the fact that the usual days for broadcasting, June 5th and 6th, occurred at a week-end, the figures had been received and plotted in the Meteorological Office by the evening of the 7th, a remarkable fruit of international organization applied to meteorology.

Aerology of the Karakorum Mountains*

In the extreme north-east of Kashmir, between the western Himalaya and the western branch of the Kuenlun, stretches the great mountain region known as the Karakorum with its steep and mighty peaks—60 summits exceed 22,000 ft.—and its great glaciers.

There is still much to be learned about the climate of Tibet and central Asia and the meteorological observations made by the three Dutch expeditions to the Karakorum add a little more to our knowledge of the weather conditions in that part of the globe.

The expeditions took place from June to October, 1922, from May to October, 1925 and from June to July, 1930. The observations, made with the aid of instruments supplied by the Royal Dutch Geographical Society and the Royal Dutch Meteorological Institute, are discussed both collectively and individually. It is noted that the differences in height of the regions explored is considerable and that only a few observations are available for the same levels. One cannot, as the author admits himself, place too much value on the data obtained—particularly some of the individual observations. Since, moreover, the computation, for a particular level, of values of temperature, relative humidity, etc., was made by using all the available observations at 250 m. above or below this level, there is some doubt as to the order of accuracy of such data. Nevertheless, these observations, which are given in tabular form at the end of the article, afford useful material for discussion. The author analyses,

* Bleeker, W., Meteorologisches zu den 3 holländischen Karakorum-Expeditionen. Reprinted from *Amsterdam, Proc. Acad. Sci.*, 39, 1936, Nos. 6, 7 and 8.

for each month June to September, the observations of temperature, humidity, pressure, wind and precipitation and he arrives at some interesting but tentative conclusions.

To review them in detail would require a large amount of space, so the writer must content himself with a few remarks on the most interesting findings.

By the beginning of June, the track of the disturbances (mostly old occluded depressions) which cross north-west India roughly from the west to east has receded northward and only the extreme north of Chitral and Kashmir is affected, and then only occasionally. The disturbances usually begin to cross the extreme north of India again in October. It is surprising how these disturbances, which may travel from the Mediterranean and Asia Minor right across Persia and Afghanistan, traversing many mountain ranges en route, maintain their activity. Sometimes they give birth in the plains of India to new disturbances or secondaries—complete with "fronts" and an isobaric system similar to that associated with European depressions. The writer agrees with the author that the observations made between June 29th and July 10th, 1929 indicate, although rather late in the year, the easterly passage of a disturbance to the north of the point of observation. A föhn wind from the north-west, clear skies and exceptionally good visibility are phenomena commonly experienced in the rear of these disturbances.

Instability showers are frequent and fairly general in north Kashmir during the summer months, but in the south—especially in July and August—there is often an invasion of the monsoon current brought northwards by the monsoon depressions which usually travel from the Bay of Bengal north-westwards towards Rajputana and the Sind and which sometimes develop secondaries over the north Punjab.

To a very great extent the interior of Kashmir and the mountain ranges to the north are sheltered from the effect of the monsoon by the Panjal range, but, on the other hand, there is no doubt that the air which penetrates north-eastwards beyond this range is sometimes sufficiently laden with moisture to produce copious precipitation in Baltistan right up to the Karakorum country—the eastern end of which does not lie completely in the wind shadow of the peaks of the western Himalaya. This is mentioned because the author emphasises the difference which the observations, taken mainly between heights of 3 and 5 Km., reveal between the summer climate of the Hunza district and the eastern Karakorum. A comparison of the data for the two areas shows that conditions in the Hunza district—although the general run of the valleys is approximately the same—are on the average distinctly cooler (about 3 to 5° F.) and appreciably dryer with less cloud and less precipitation than those of the eastern Karakorum. It is pointed out in the article that the differences may be due partly to orographical causes. The valleys

in the Hunza area (which lies to the west of the Karakorum) are steeper and the mountain slopes more precipitous than in the eastern Karakorum where the landscape has more the appearance of a plateau. The effect of insolation would therefore be greater in the latter area. Consequently there would be more turbulence—which might account for the tendency for humidity to increase with height in the eastern Karakorum. The author adds, however, that in this area the wind from 5 to 7 Km. in the free atmosphere (mainly west-south-west) has a larger southerly component than the wind (mainly westerly) in the Hunza district and suggests the possibility that these winds do not have the same origin, that is, that they belong to different air masses.

A comparison with the upper air data for Agra (obtained by means of sounding balloons over the plains of the United Province) shows that the temperature between 4 and 6 Km. in both districts is apparently several degrees higher than at Agra. Also, the author adds, according to the charts in Wagner's well-known treatise* on the south-west monsoon, one would expect the winds at 4 and 5 Km. both at Agra and in the two regions in question to belong to the same air mass. Why then is the air over the mountains apparently so much warmer than over the plains? It is admitted that the estimation of the free air temperature in the mountain region may be incorrect by a degree or two but a study of available pilot balloon ascents and observational data on the height of the snow line lend support to the conclusion that Wagner's charts for the 4–5 Km. levels need modification and that the winds at this level at Agra and in the eastern Karakorum belong to different air masses. It is realised, of course, that one must take into consideration the fact that the westerly winds of the Hunza area must cross the towering mountains of the Hindu Kush whereas the more southerly winds of the eastern Karakoram would have much smaller ranges to negotiate. At 6 Km. the observed wind directions in both districts agreed well with extrapolated stream lines of air flow at 6 Km. prepared by Wagner. The writer must point out, however, that the charts of Wagner were based on the mean wind data for June, July and August and June is not a truly monsoon month in northern India. Moreover, the data used for heights above the 3 Km. level were very scanty.

If the author will refer to the paper by Ramanathan and Ramakrishnan on the structure of monsoon depressions† he will now find a more detailed analysis of upper air temperatures and the streamlines of air flow for each month May, June and July. The charts for July are particularly instructive as they indicate the surfaces of discontinuity between continental air, fresh and old

* Wagner, A. Zur Aerologie des indischen Monsuns, *Beitr. Geophys., Leipzig*, 30, 1931, p. 196.

† Ramanathan, K. R. and Ramakrishnan, K. P. The Indian south-west monsoon and the structure of depressions associated with it. *Poona, India met. Dep.* 26, Part II, 1933.

monsoon air. The occasional inflow of mixed monsoon air between 4 and 6 Km. into the eastern Karakorum may be inferred from Figs. 16 and 17. It has already been pointed out that the relatively low range of the Panjal may not completely dry off the air masses which pass over it. On the other hand it appears reasonably certain that the air of the Hunza district would be almost completely and continuously continental. Hence the observed differences of climate between these two particular regions.

The meteorological information obtained by the three Dutch expeditions is undoubtedly of considerable value and must be taken into consideration when future investigations of the structure of the south-west monsoon are made. R. G. VERYARD.

Royal Meteorological Society

The monthly meeting of the Society was held on Wednesday, May 26th, at 49, Cromwell Road, South Kensington. Dr. F. J. W. Whipple, F.Inst. P., President, was in the Chair.

The following papers were read and discussed :—

E. W. Hewson, M.A. (Beit Scientific Research Fellow).—The application of wet-bulb potential temperature to air mass analysis. III. Rainfall in depressions.

This paper was postponed from the April meeting. For abstract see p. 86.

E. Kidson, M.A., D.Sc., F.Inst.P.—The cyclone series in the Caribbean Sea, October 17-24, 1935.

It has been held by some who have applied frontal methods of analysis to tropical cyclones, that it is the air that comes across the equator which acts as the cold air. The author has twice passed through the Caribbean Sea during disturbed periods, and the present paper is a study of the weather experienced : the information available indicates that the cold air came from the north and that the air from across the equator was the warm mass.

C. S. Durst, B.A.—The revolving storm of tropical origin which travelled across the Atlantic in September, 1936.

During the first week of September, 1936, a tropical revolving storm moved over the Atlantic. Its behaviour relative to the polar front is described, and it is shown that it retained its character of a revolving fluid almost to the Irish coast.

Correspondence

To the Editor, *Meteorological Magazine*

Clouds caused by Aeroplanes

At 10h. on March 31st, while in the neighbourhood of Hove, Sussex, my attention was caught by a thin spear of snow-white cloud, projecting in a dead straight line above a patch of much " dirtier "

white fractocumulus. The lower cloud gradually caught up and over-ran the " spear ", and in the patch of blue sky to windward (south-east) I then observed that there were two parallel bands of cloud stretching up-wind for about 2 miles, where they were lost above another group of fractocumulus.

As I watched, these lines slowly unwound in corkscrew spirals, but although they lost their clear-cut definition and " whiteness," their general direction remained the same. The unwinding quite definitely started to windward and did not reach the leading edge of the first line I had seen till 10h. 15m. By 10h. 17m. breaks had begun to appear in the two lines, which became increasingly difficult to trace against a background of cirrostratus and cirrocumulus. The latter formed in two sets of waves : the main one running from south-east to north-west with subsidiary waves (apparently) above them from north-west to south-east.

There was neither sign nor sound of the two planes which in my opinion must have caused the " line" clouds which when first observed were far too regular to have been formed by other than mechanical means.

D. S. HANCOCK.

Greenways School, Bognor Regis, Sussex, April 1st. 1937.

Six Solar Haloes in Eight Days

These occurred May 27th to 30th and June 2nd and 3rd; a series unusual in my experience. Indeed in the six years 1930–5, the nearest are five days, Oct. 1st to 7th, in 1930, March 13th to 18th, 1931, and May 11th to 17th, 1933 ; 7 days in all being noted for that month.

Those of May 27th, 28th and June 2nd, 1937, were well marked and prolonged, strikingly so on the 28th. In the May haloes high level cloud streaks stretched and seemed to move from north-east to south-west. On the 27th and 30th the visible cloud formed a thin blanket, though hardly obscuring much sunshine, whilst there was also low level haze. On the 27th the Mendip rampart, distant 8 to 15 miles from north-west to north-east, was obscured. The halo, though bright, was almost a dusky yellow monotint, brighter in the centre and about $1\frac{3}{4}^{\circ}$ wide, with the inner space only slightly dull. On the 30th, with the nearer Mendips just visible, the conditions were similar but the halo hardly as bright.

Visibility on the 28th was somewhat exceptional. The broad cloud streaks alternated with bands of clear sky down to the south-east and north-west sky lines. Not only were Brean Down and Steep Holm in the Bristol Channel clearly visible, 20 and 24 miles distant from a point on the Poldens at a height of 250 ft., but the low Welsh area between Barry and Cardiff fairly so, fully thirty miles off. This also was just visible on the 29th. From or before 9 a.m. to 4 p.m. on the 28th the sunshine was hardly dimmed and

the thermometer at 76° was the highest here for the year. But below this tenuous haze between 2 and 3 p.m., a very delicate alto-cirrus began to appear at the south-west point of the halo. It quickly became iridescent, lasting so for about an hour as it enlarged to about 15° by 5°. Otherwise, the sky within the halo remained of a uniform and unusually dark grey shade. Continuing to spread and thicken the whole halo was hidden soon after 5.45 p.m. The very uniform halo was about 2° across with a bright, sharply defined centre of ½°, half a dusky red, half green blue, shading off respectively to dull red and a creamy white, brighter than the adjacent cirrus haze. By 5 o'clock all the south-west quadrant was obscured by the expanding cloud, no longer iridescent after 3 o'clock. Gradually most of the streaks to north-west and south-east were obscured and the rest of the halo.

That on the 29th appeared for two or three short intervals, showing only the ½° of bright colours. The last, on June 3rd, resembled those of the 27th and 2nd, but only lasted about ¾ hour about 2 o'clock. None developed any type of accessories, nor did the few glimpses of the moon exhibit any lunar phenomena. By June 4th upper air conditions completely changed after a mild night, bringing a slight shower in the afternoon, the first since May 26th. All through barometric variation was very slight, about 30·20 in. to 30·45 in. Night temperatures until the 4th varied from about 42° to 46°. All times given are G.M.T. J. EDMUND CLARK.

Street, Somerset, June 4th, 1937.

[Mr. G. A. Clarke, of Aberdeen Observatory, reports that he observed a solar halo every day during the week May 23rd to 29th inclusive and adds that he believes that this is unique in his experience. Ed. *M.M.*].

NOTES AND QUERIES

Anemometer Mast Belts

On Wednesday, May 5th, as I was walking along a country road I saw a Post Office linesman with his telephone, belt and irons. He was led to tell me what he had been doing, and I made a remark about the belt which he then showed me. I said we had similar belts but they were found to be rather heavy. He replied that the belt was heavy but he always wore it when he went up the poles. He said that when he was younger he had not considered it necessary always to put on the belt but one day he fell from a pole and broke his ankle.

I note the incident in the hope that it may be of some use in encouraging meteorologists who have to ascend anemometer masts to use belts without waiting to be individually convinced as this Post Office linesman had been. E. GOLD.

Aurorae at Eskdalemuir, April 25th–28th and May 4th, 1937

On the nights of April 25th–28th inclusive, and of May 4th, active aurorae were observed at Eskdalemuir Observatory. The following is a brief account of the displays, taken from notes, and of the associated magnetic disturbance of April 26th–27th. All times mentioned are G.M.T. The aurorae of April 25th–28th were seen under a full moon. The visibility was over 18 miles in each case, and there was practically no cloud. The angular elevations given are of the highest point of the arches under consideration.

April 25th.—A greenish arch, elevation 4°, was first observed at 21h. 40m. From then until 22h. 33m. this gradually rose in the sky, broadened, and became brighter with dark sky underneath. Streamers, and less frequently, curtains appeared at intervals, particularly to the north-east. From 22h. 36m. to 22h. 44m. the display was at its maximum; the arch broke up into undulating curtains, whilst countless streamers swept the northern sky. A brilliant purple glow, which first appeared in the west, changed to crimson and extended from west to east through the zenith. From 22h. 45m. to 23h. 59m. the display was less intense, the main features being the formation of arches which gradually broke up into diffuse nebulous patches, whilst streamers and bundles of rays were frequent.

April 26th.—At 22h. 15m. a brilliant greenish arch, elevation 12°, was first seen. This gradually rose in elevation, an interesting point being that the arch consisted of major and minor arcs of different curvatures. From 22h. 23m. to 22h. 30m. the arch was covered to a greater or lesser extent with undulating greenish drapery. At 22h. 32m. the arch broke up into draperies and streamers, which seemed to radiate from some point below the horizon. At 22h. 24m. the display consisted of a double arch, the two curves meeting at points on the horizon, the azimuth of these points being 270° and 55°, and the elevation of the arches 60° and 37°. These arches gradually rose in elevation in the sky until they formed parallel bands nearly overhead. At 23h. 40m. most of the northern sky was covered in draperies, whilst the outstanding feature was the appearance of parallel flickering bands, orientated east to west, which swept through the zenith to disappear southwards. The display reached its maximum at 23h. 52m. A corona formed overhead with rays and draperies radiating northwards, whilst crimson and green glows appeared to the west and north. After 0h. 2m. the display rapidly decreased in intensity.

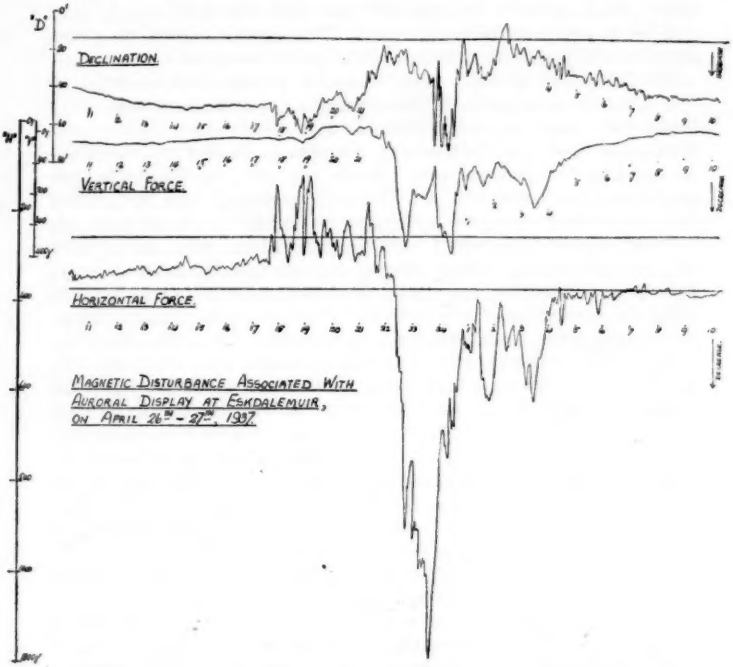
April 27th.—At 21h. 45m. a reddish glow and faint streamers were first seen. This developed into a moderately bright arch, elevation 6°, at 22h. 15m., with bright rays at intervals.

April 28th.—At 21h. 40m. a brilliant, greenish, vertical bundle of rays moved from north-west to west taking about five minutes, afterwards fading slowly.

May 4th.—At 22h. 20m. a moderately bright glow was seen to the

north, with faint streamers to north-east. This deteriorated to a faint glow at 22h. 45m., and was obscured by cloud at 23h.

MAGNETIC DISTURBANCE, *April 26th-27th*, 1937.—Considerable disturbance was shown on the magnetic traces for April 26th–27th, especially in H, the range in this element being the largest since 1928.



The disturbance commenced at approximately 17h. 40m. on the 26th and continued until 7h. on the 27th. The maximum value of 16719γ in H was reached at 18h. 54m. After reaching its maximum H was continuously disturbed, and from a value of 16481γ (·16481 C.G.S. units) at 22h. 17m. it fell rapidly to a minimum of 15613γ at 23h. 45m. From this minimum H rose in a series of jerks to 16436γ at 1h. 22m. The disturbance continued, but with much less severity, until 7h. on the 27th.

Principal disturbance in D took place between 0h. 27m. when a maximum of 13° 55·8′ was reached, and 2h. 30m. when a minimum value of 12° 55·5′ was recorded. Disturbance was very pronounced between 0h. 10m. and 2h. 30m. when very rapid changes occurred.

The maximum value of 44985γ in V was reached at 21h. 19m. on the 26th, and a minimum value of 44566γ was recorded at 0h. 30m. on the 27th. A feature of the V disturbance was a sudden fall from 44931γ at 22h. 10m. to 44591γ at 22h. 50m. V then rose to 44854γ at 23h. 50m. and fell to its minimum value of 44566γ at 0h. 30m. on the 27th.

J. B. Beck.
D. W. Rhead.

Aurorae at Leuchars and Fort Augustus, April 26th–30th.

Aurorae were seen by Mr. S. T. A. Mirrlees and Mr. H. H. Lamb at Leuchars on April 26th–30th.

According to these observations, on April 26th rays, first seen at 21h. 0m. G.M.T., quickly developed, reaching a maximum at 21h. 35m. when there were four distinct bundles between west and north-east, those in the centre having a greenish tinge. A little later the outer ones became pink and shortly before 22h. 0m. the whole structure faded. At 22h. 5m. an arc developed and the rays reappeared. but without colour: the arc became double and later manifold. At 23h. 35m. the rays were moving rapidly from the west and reached south of the zenith. When at their brightest the rays were judged to be 5–10 times as bright as searchlight beams.

Conditions were less favourable at Leuchars on the 27th, the sky becoming clouded after a double arc with vertical rays, some pink, in similar positions to those of the 26th, had been observed. Less remarkable displays were also seen at Leuchars on April 28th and 30th.

On the 27th the display was also seen from several places further north including Fort Augustus where Mr. F. E. Dixon, from 23h. 30m. to 24h. 0m., observed a rayed arc associated with draperies and finally at about 23h. 50m. a faint flame aurora. The colour was green throughout.

REVIEW

The daily temperature period for a linear variation of the Austausch coefficient, by B. Haurwitz. Transactions of the Royal Society of Canada. Third Series, Sec. 3, Vol. 30, 1936.

It has been assumed by several investigators when studying the diurnal variation of temperature at various heights that the Austausch coefficient is independent of height. This undoubtedly simplifies the work but leads to results which do not agree with the observed facts.

In this paper the author assumes that the Austausch coefficient is a linear function of the height and obtains a solution of the equation relating temperature to time and height in terms of Bessel functions. He then shows that if the Austausch coefficient is calculated from the ratio of the amplitudes of the temperature variation at two heights, assuming that the former does not vary in this layer, the

value obtained may be much less than the average value. Similarly, if the coefficient is assumed to be constant and is calculated from the times of maximum temperature, the value obtained will not be the average value if, in fact, the coefficient varies linearly with height.

Accordingly the author develops a method of calculating the Austausch coefficient from the lag of the time of maximum temperature at two heights, assuming that the former varies linearly with height. This method involves the use of numerical values of the kei and ker functions. It is set out very clearly and a table of values of the Bessel functions involved is given in the form in which they are required for the computation.

Although not primarily concerned with observational material the author gives an example of the computation based on assumed values for the lag of the time of maximum temperature at 100m. and 200m.

A slight modification of the method for use when the variation of the Austausch coefficient with height is small is also shown and the paper closes with an example of this method based upon some figures due to Schmidt which refer to the Eiffel Tower.

A. C. BEST.

BOOKS RECEIVED

Hourly rainfall at Lahore. By V. Doraiswamy Iyer, B.A., and V. Lakshminarasimhan, B.A., India Meteor. Dept., Sci. Notes, Vol. VI, No. 68.

A statistical analysis of the distribution of the south-west monsoon rainfall at Akola. By V. Satakopan, M.A., India Meteor. Dept., Sci. Notes Vol. VII, No. 69.

OBITUARY

James Hermann Field, C.S.I.—In the early morning of May 19th Mr. J. H. Field, C.S.I., passed away at his home at Reigate to the sorrow of many friends in this country and India. A member of the staff of the India Meteorological Department for 24 years and Director for a little over three years, he played an important part in developing the Meteorological Service of India into one of the most efficient and up-to-date meteorological services in the Empire. A loyal assistant to Sir Gilbert Walker, his chief for over twenty years; a friend to all his colleagues, both European and Indian; an efficient and conscientious servant of Government, he was a splendid example of the Englishmen who, leaving Home to serve India, have laid the foundations on which that great country is building its future.

Field was born on December 23rd, 1872, and was educated at Highgate School and Finsbury Technical College. For a short time

he practised as an electrical engineer with a partner in Victoria Street, London, but in 1898 he retired from the business and went to St. John's College, Cambridge.

He did not take his degree until 1904, as his course at Cambridge was interrupted for two years by service in South Africa in the Boer War. Soon after taking his degree Field was invited by Sir John Eliot to join the staff of the India Meteorological Department, then being reorganized with Sir Gilbert Walker ás the new Director-General of Observatories.

To give an account of Field's work in India would involve writing a history of the India Meteorological Department during the last thirty years and this is neither the time nor the place for such a history. I must limit my remarks to the two outstanding features of Field's work, namely, his upper air research and the building of the Poona Meteorological Office, as these are the two things for which he will always be remembered.

When Field arrived in India practically nothing was known of the upper air over India—or, indeed, of any other tropical continent. With Sir Gilbert Walker's permission and encouragement Field immediately threw himself into the investigation. His early observations were made with kites, but as Simla was not a suitable place for observations he took his apparatus first to Karachi and then to Belgaum, near the west coast, with the object of investigating upper air conditions during the south-west monsoon. During the hot weather he carried out observations with sounding balloons at Jhang in the Punjab, one of the hottest spots in India. Field designed all his own kites and instruments and made the latter with his own hands in a very rudimentary workshop in Simla. In 1907 Field returned to England on leave and took the opportunity of making kite ascents from the ship as she crossed the Indian Ocean.

Little more than experimental work was done until 1912 when the Government of India decided to establish an upper air observatory at Agra. The new observatory, designed by Field, was completed in 1914 after which he remained in charge of it until he succeeded Walker as Director-General of Observatories in 1924. The upper air work at Agra is now well-known; soundings of the upper air were made by means of balloons and instruments designed or adapted by Field, and Agra became the centre of a network of stations making observations of upper air currents by means of pilot balloons.

Unfortunately the Great War broke out a few months after the establishment of the new observatory and the scientific programme had to be reduced for several years to what could be carried on by routine methods in the hands of Indian assistants. Field himself returned to England to undertake war work at the Admiralty Experimental Station, Shandon, in 1918.

On the return of more normal conditions the work at Agra was taken up again with Field in charge and W. A. Harwood as Assistant Director. Up to that time very little had been published of all the

work done, either experimental or observational. Field and Harwood set to work to write up the results, Field writing a full account of the instruments and methods used and Harwood the scientific discussion of the data. Field's article was published as an introduction to a series of memoirs by Harwood entitled " The Free Atmosphere in India," and is his main contribution to meteorological literature.

For the amount of work carried out and the importance of that work Field's contribution to scientific literature is unusually small; but the value of his work cannot be estimated by the amount of writing he did; it was his enthusiasm, his power of impressing with the importance of the work his non-scientific superiors in the Government of India, and the co-operation he inspired in his staff at Agra, which make Field's work outstanding.

Just before retiring in 1924 Sir Gilbert Walker received the approval of the Government of India to his suggestion to remove the headquarters of the India Meteorological Department from Simla to Poona. This was a change very near to the heart of Field who had always considered that the impossibility of carrying out upper air observations from Simla made that station totally unfitted for the headquarters of a meteorological service. One of his first duties on becoming Director-General of Observatories was to design the new building for the Department in Poona. The verdict of all who have seen the new office is that it is one of the best designed Meteorological Offices in the world and worthy of the great meteorological service it houses. Unfortunately Field himself did not see the completion of his work for he left India on March 3rd, 1927, on twelve months' leave preparatory to retirement and the new office was not officially opened until July, 1928.

On his retirement Field returned to England and served on the Council of the Royal Meteorological Society.

In 1929 owing to the loss of aircraft in the Bay of Gibraltar due to air turbulence caused by the Rock in high winds, Field was invited to undertake an investigation. He carried out a notable piece of work, first investigating the air currents about a model of the Rock in a wind tunnel at the National Physical Laboratory and then by means of kites and balloons, checking the results obtained in the tunnel by observations in the Bay of Gibraltar. The results have proved of great value to the pilots of aircraft flying in the neighbourhood of the Rock.

In 1931 Field married Mrs. Salter, the widow of Mr. M. de. C. S. Salter, for several years the Superintendent of the British Rainfall Organization, who survives him.

I cannot close this short account of Field's scientific work without adding a personal note. Field was my best friend; we " chummed " together for several years in Simla and we have remained in close personal contact and uninterrupted friendship for over 30 years. A man of retiring disposition, he had character stamped on every lineament and he had great influence with the high officials of the

Government of India. Honesty and integrity were the essence of his being—in fact his honesty in small matters was occasionally embarrassing. His generosity was unbounded as his friends and relations, but very few others, know. When I was raising funds for instruments to be used on the Antarctic Expedition he gave me by far the largest donation I received and one sufficient to remove all my difficulties. Probably the highest evidence of his fine character is in the cordial relationship which existed between him and his Indian staff; from bearer and chaprassie to chief clerk and scientific assistant, they all respected and trusted Field Sahib.

G. C. SIMPSON.

NEWS IN BRIEF

Prof. W. L. Bragg, F.R.S., who has held the Langworthy Chair of Physics in the University of Manchester since 1919, has been appointed Director of the National Physical Laboratory in succession to the late Sir Joseph Petavel K.B.E., F.R.S.

The Institute of Meteorology and the Institute of Physical Geography which hitherto have been two separate institutions of the University of Latvia, Riga, are now united under the name of the "Institute of Geophysics and Meteorology" with Prof. Dr. Rudolf Meyer, head of the combined institute.

We learn that Dr. Mario Bossolasco, Professor of the University of Turin, has been appointed Professor of Geophysics and Geodesy in the University of Messina.

ERRATUM

MAY 1937, p. 94, line 8, *for* "March 10th" *read* "March 9th".

MAY, 1937, p. 87. Halo phenomena of April 19th, 1937. The times given for the halo observed by Mr. H. Kearney at University College, Dublin, are in British Summer Time not G.M.T.

The Weather of May, 1937

The weather of May over the British Isles generally was fine, sunny and warm at the beginning and end of the month with a cool unsettled period especially in the south and east from about the 8th to 22nd. Sunshine totals exceeded the normal in west Scotland, west England and Ireland but were deficient in the south and east, while rainfall was above normal generally except in Scotland and north and east Ireland. Thunderstorms were frequent and mist or fog occurred locally on many days. From the 1st to

3rd pressure remained high over the British Isles and fine quiet warm conditions prevailed, 73° F. was reached at Tottenham, South Farnboro', Mildenhall and Tunbridge Wells on the 3rd and 71° F. at Fort Augustus on the 2nd, while over 13 hrs. bright sunshine were registered at several stations on the 2nd and 3rd, 14·0 hrs. at Tiree on the 2nd. On the 3rd thunderstorms were widespread in England and south Scotland. On the 4th a trough of low pressure passed north-eastwards across the country giving slight rain in most parts and on the night of the 6th–7th rain also fell generally, but otherwise until the 8th the weather continued mainly fair with much sun on the 5th, and also in the east and north on the 6th. Mist or fog occurred locally on the 2nd and 3rd and was prevalent on the west coast on the night of the 6th–7th and again the next night in the south. Gales were experienced early on the 5th at Stornoway and later the same day at Spurn Head. By the evening of the 8th the approaching depression on the Atlantic had brought rain to the south-west and from then to the 15th pressure was mainly low over the country and the weather generally cool and unsettled in the south and east but with much sun most days in west Scotland, west England and Ireland; 16·0 hrs. were recorded at Tiree on the 13th. On Coronation Day while cloudy unsettled weather occurred in most parts of England with heavy thunder showers in the south sometimes accompanied by hail (at Rowledge, Surrey the recreation ground was at one time white with hail), over 14 hrs. bright sunshine were recorded at Tiree, Stornoway and Dalwhinnie and over 13 hrs. in parts of north Ireland. Local mist or fog was reported on several days during this period. From the 15th–17th a ridge of high pressure lay over the country giving generally fair sunny weather, except in the south-east where considerable cloud developed on the 15th and 16th and some mist or fog. Thunderstorms occurred in south Scotland, north England and Ireland on the 17th. From then to the 22nd depressions crossed the country. The weather was unsettled with frequent and sometimes heavy rain but considerable sunny periods; 2·33 in. fell at Rendlesham (Suffolk) on the 20th and 1·66 in. at Borrowdale (Cumberland) on the 22nd. Thunderstorms were again general on the 20th and 21st. From the 23rd to 26th, pressure was low to the west and high to the east and temperature rose considerably. Warm sunny days were experienced in the east but rain with sunny intervals in the west. On the 25th and 26th however, thunderstorms were widespread and often accompanied by heavy rain, 1·50 in. fell at Nettlebed, Oxford, on the 25th. From the 27th to 31st fine warm sunny anticyclonic conditions prevailed over the country except the extreme north where depressions further north and west brought gales on the 27th, 30th and 31st, and rain at times. In the south-east maximum temperatures reached 80° F. in places on the 29th and 30th. The distribution

of bright sunshine for the month was as follows :—

	Total (hrs.)	Diff. from normal (hrs.)		Total (hrs.)	Diff. from normal (hrs.)
Stornoway ...	236	+57	Chester ...	182	+16
Aberdeen ...	164	−6	Ross-on-Wye ...	199	+13
Dublin	209	+29	Falmouth ...	185	−22
Birr Castle ...	213	+44	Gorleston ...	198	−25
Valentia... ...	221	+37	Kew	173	−25

Kew, Temperature, Mean 56·1° F., Diff. from normal + 1·6° F.

Miscellaneous notes on weather abroad culled from various sources.

A cloudburst occurred at Voula on the sea-coast 12 miles south-east of Athens on the 5th during which a K.L.M. air liner was forced down. Dense fog was experienced in the Gulf of Danzig about the 9th and fog was reported off the west coast of Holland and in the River Weser on the 11th. The ice had gone and navigation was reopened at Uleaborg, Finland on the 13th. Thick fog was experienced on Orësund on the 14th. One of the pylons at the Radio Toulouse broadcasting station was struck by lightning during a violent storm on the 17th. Fog occurred near Istanbul on the 19th. A severe south-westerly gale over central and eastern Switzerland on the 20th did much damage to the orchards near the Lake of Lucerne ; on the same day there was a fall of yellow sand at Muttenz in Canton Basle and a heavy fall of red sand in the Engadine. The gale extended also into Upper Bavaria on the 21st, where it did much damage to the fishing boats on the Chiemsee. After floods in Thuringia two days earlier severe storms broke over central Germany on the 21st followed by floods. On the 22nd severe storms accompanied by hail and floods swept over south-western Poland causing loss of life and much damage to property—it is believed that 40 people were drowned. A thunderstorm of exceptional violence broke over Budapest on the 23rd and was followed by torrential rain causing floods in the vicinity. Early on the 24th there was unusually heavy rain preceded by thunder and lightning and accompanied by gales in the neighbourhood of Belgrade ; the rain later turned to hail and some streets were reported to be 3 ft. deep in ice. Many people also were drowned in Bulgaria as the result of heavy rain between the 23rd and 26th. Thunderstorms and fog were reported on Oslo Fjord on the 27th. (*The Times*, May 6th–31st.)

Duststorms occurred on the North-West Frontier on the 8th and a heat wave was sweeping over north-west India about the 19th. On the 18th the monsoon burst in Rangoon. (*The Times*, May 10th–19th.)

The total rainfall for the month in Australia was considerably below the normal except in South Australia, Western Australia and Tasmania where at some places it was above normal. (Cable).

Floods occurred in Vermont, New Hampshire, and in Massachusetts

(*Continued on p. 128*)

Rainfall: May, 1937: England and Wales

Co.	Station.	In.	Per cent of Av.	Co.	Station.	In.	Per cent of Av.
Lond.	Camden Square.....	2·89	164	*War.*	Birminghm, Edgbaston	2·50	116
Sur.	Reigate, Wray Pk. Rd..	2·41	132	*Leics.*	Thornton Reservoir ...	2·35	117
Kent.	Tenterden, Ashenden...	2·86	182	,, .	Belvoir Castle.....	3·48	165
,, .	Folkestone, Boro. San.	3·09	...	*Rut.*	Ridlington	3·78	187
,, .	Margate, Cliftonville....	2·43	154	*Lincs.*	Boston, Skirbeck.....	5·29	292
,, .	Eden'bdg., Falconhurst	2·62	141	,, .	Cranwell Aerodrome...	3·64	200
Sus.	Compton, Compton Ho.	2·54	114	,, .	Skegness, Marine Gdns.	3·94	232
,, .	Patching Farm.....	2·13	115	,, .	Louth, Westgate.....	3·28	159
,, .	Eastbourne, Wil. Sq....	2·57	155	,, .	Brigg, Wrawby St.....	2·90	...
Hants.	Ventnor, Roy.Nat.Hos.	1·70	100	*Notts.*	Worksop, Hodsock.....	3·39	170
,, .	Fordingbridge, Oaklnds	2·85	137	*Derby.*	Derby, L. M. & S. Rly.	2·20	115
,, .	Ovington Rectory.....	3·06	141	,, .	Buxton, Terrace Slopes	2·42	78
,, .	Sherborne St. John.....	3·10	160	*Ches.*	Bidston Obsy.....	3·44	181
Herts.	Royston, Therfield Rec.	3·12	161	*Lancs.*	Manchester, Whit. Pk.	1·86	88
Bucks.	Slough, Upton.....	2·73	162	,, .	Stonyhurst College.....	2·05	72
,, .	H. Wycombe, Flackwell	3·57	196	,, .	Southport, Bedford Pk.	1·89	90
Oxf.	Oxford, Radcliffe.....	2·62	140	,, .	Ulverston, Poaka Beck	2·04	64
N'hant.	Wellingboro, Swanspool	3·93	203	,, .	Lancaster, Greg Obsy.	2·06	83
,, .	Oundle	3·01	...	,, .	Blackpool	1·80	83
Beds.	Woburn, Exptl. Farm...	3·94	203	*Yorks.*	Wath-upon-Dearne.....	2·68	117
Cam.	Cambridge, Bot. Gdns.	2·51	143	,, .	Wakefield, Clarence Pk.	2·96	150
,, .	March.....	3·78	218	,, .	Oughtershaw Hall.....	2·94	...
Essex.	Chelmsford, County Gdns	2·54	176	,, .	Wetherby, Ribston H..	3·63	175
,, .	Lexden Hill House.....	2·12	...	,, .	Hull, Pearson Park.....	3·40	176
Suff.	Haughley House.....	2·59	...	,, .	Holme-on-Spalding.....	2·62	115
,, .	Rendlesham Hall.....	3·87	253	,, .	West Witton, Ivy Ho.	4·06	181
,, .	Lowestoft Sec. School...	2·35	146	,, .	Felixkirk, Mt. St. John.	2·73	145
,, .	Bury St. Ed., Westley H.	2·48	136	,, .	York, Museum Gdns....	3·45	173
Norf. .	Wells, Holkham Hall...	3·19	196	,, .	Pickering, Hungate.....	2·48	127
Wilts.	Porton, W.D. Exp'l. Stn	2·42	141	,, .	Scarborough.....	3·47	171
,, .	Bishops Cannings.....	2·25	115	,, .	Middlesbrough.....	2·51	131
Dor.	Weymouth, Westham.	3·28	201	,, .	Baldersdale, Hury Res.	3·12	122
,, .	Beaminster, East St....	3·28	159	*Durh.*	Ushaw College.....	3·09	143
,, .	Shaftesbury, Abbey Ho.	2·40	114	*Nor.*	Newcastle, Leazes Pk...	2·68	135
Devon.	Plymouth, The Hoe....	2·70	130	,, .	Bellingham, Highgreen	3·09	129
,, .	Holne, Church Pk. Cott.	4·68	149	,, .	Lilburn Tower Gdns....	3·52	153
,, .	Teignmouth, Den Gdns.	2·56	123	*Cumb.*	Carlisle, Scaleby Hall...	3·46	145
,, .	Cullompton	2·41	111	,, .	Borrowdale, Seathwaite	...	...
,, .	Sidmouth, U.D.C.....	2·62	...	,, .	Thirlmere, Dale Head H.	3·19	67
,, .	Barnstaple, N. Dev.Ath	1·92	95	,, .	Keswick, High Hill.....	1·92	60
,, .	Dartm'r, Cranmere Pool	4·00	...	*West.*	Appleby, Castle Bank...	3·03	138
,, .	Okehampton, Uplands.	2·73	101	*Mon.*	Abergavenny, Larchf'd	2·28	85
Corn.	Redruth, Trewirgie.....	2·37	103	*Glam.*	Ystalyfera, Wern Ho....	2·99	86
,, .	Penzance, Morrab Gdns.	1·85	84	,, .	Treherbert, Tynywaun.	3·24	...
,, .	St. Austell, Trevarna...	3·22	133	,, .	Cardiff, Penylan.....	2·35	96
Soms.	Chewton Mendip.....	2·58	97	*Carm.*	Carmarthen, M. & P. Sch.	2·12	74
,, .	Long Ashton.....	2·56	121	*Pemb.*	St. Ann's Hd, C.Gd.Stn.	1·13	59
,, .	Street, Millfield.....	2·21	...	*Card.*	Aberystwyth	1·54	...
Glos.	Blockley	2·70	...	*Rad.*	Birm W.W.Tyrmynydd	2·39	69
,, .	Cirencester, Gwynfa....	2·12	103	*Mont.*	Lake Vyrnwy	2·90	92
Here.	Ross-on-Wye.....	2·38	112	*Flint.*	Sealand Aerodrome.....	2·66	...
Salop.	Church Stretton.....	2·14	86	*Mer.*	Blaenau Festiniog	1·75	34
,, .	Shifnal, Hatton Grange	2·67	130	,, .	Dolgelley, Bontddu.....	2·66	80
,, .	Cheswardine Hall.....	3·02	136	*Carn.*	Llandudno	1·64	92
Worc.	Malvern, Free Library...	2·96	137	,, .	Snowdon, L. Llydaw 9..	3·45	...
,, .	Ombersley, Holt Lock.	2·33	114	*Ang.*	Holyhead, Salt Island...	·75	38
War.	Alcester, Ragley Hall..	2·35	114	,, .	Lligwy	1·34	...

Rainfall: May, 1937: Scotland and Ireland

Co.	Station.	In.	Per cent of Av.	Co.	Station.	In.	Per cent of Av.
I. Man	Douglas, Boro' Cem....	1·70	68	*R&C* .	Achnashellach	2·96	66
Guern.	St.Peter P't.Grange Rd.	4·04	237	„ .	Stornoway,C.GuardStn.	2·65	...
Wig .	Pt. William, Monreith.	2·14	91	*Suth* .	Lairg.....	1·64	65
„ .	New Luce School.....	2·24	79	„ .	Tongue	...	...
Kirk .	Dalry, Glendarroch.....	2·59	83	„ .	Melvich.....	1·07	52
Dumf.	Dumfries, Crichton R.I.	1·63	63	„ .	Loch More, Achfary....	1·93	44
„ .	Eskdalemuir Obs.....	2·59	78	*Caith* .	Wick.....	·69	33
Roxb .	Hawick, Wolfelee.....	3·60	154	*Ork* .	Deerness	·36	18
Peeb .	Stobo Castle.....	...	...	*Shet* .	Lerwick	2·60	124
Berw .	Marchmont House.....	3·68	149	*Cork* .	Dunmanway Rectory...	3·06	90
E.Lot .	North Berwick Res.....	2·83	142	„ .	Cork, University Coll...	1·94	86
Midl .	Edinburgh, Blackfd. H.	2·52	123	„ .	Mallow, Longueville....	2·36	106
Lan .	Auchtyfardle	1·47	...	*Kerry.*	Valentia Observatory...	3·33	105
Ayr .	Kilmarnock, Kay Park	1·53	...	„ .	Gearhameen.....	...	...
„ .	Girvan, Pinmore.....	1·61	54	„ .	Bally McElligott Rec...	2·35	...
„ .	Glen Afton, Ayr San....	2·11	70	„ .	Darrynane Abbey.....	2·53	94
Renf .	Glasgow, Queen's Park	1·58	65	*Wat* .	Waterford, Gortmore...	1·71	75
„ .	Greenock, Prospect H..	1·74	50	*Tip* .	Nenagh, Castle Lough.	...	...
Bute .	Rothesay, Ardencraig...	1·75	58	„ .	Roscrea, Timoney Park	...	...
„ .	Dougarie Lodge.....	1·45	53	„ .	Cashel, Ballinamona....	2·92	124
Arg .	Loch Sunart, G'dale....	3·64	102	*Lim* .	Foynes, Coolnanes.....	1·85	79
„ .	Ardgour House.....	3·99	...	*Clare* .	Inagh, Mount Callan....	2·52	...
„ .	Glen Etive.....	...	...	*Wexf* .	Gorey, Courtown Ho...	1·08	49
„ .	Oban.....	2·36	...	*Wick* .	Rathnew, Clonmannon.	1·23	...
„ .	Poltalloch.....	2·54	88	*Carl* .	Bagnalstown,Fenagh H.	1·40	57
„ .	Inveraray Castle.....	2·85	73	„ .	Hacketstown Rectory...	1·34	51
„ .	Islay, Eallabus.....	1·89	71	*Leix* .	Blandsfort House.....	2·03	83
„ .	Mull, Benmore.....	4·70	63	*Offaly.*	Birr Castle.....	2·74	123
„ .	Tiree	2·53	101	*Kild* .	Straffan House	1·66	75
Kinr .	Loch Leven Sluice.....	1·81	74	*Dublin*	Dublin, Phoenix Park..	1·16	56
Fife .	Leuchars Aerodrome...	2·37	122	*Meath.*	Kells, Headfort.....	1·81	67
Perth .	Loch Dhu.....	2·50	55	*W.M* .	Moate, Coolatore.....	2·27	...
„ .	Crieff, Strathearn Hyd.	2·96	119	„ .	Mullingar, Belvedere...	1·85	75
„ .	Blair Castle Gardens....	2·68	132	*Long* .	Castle Forbes Gdns.....	3·28	127
Angus.	Kettins School.....	1·74	65	*Gal* .	Galway, Grammar Sch.	2·35	95
„ .	Pearsie House.....	2·39	..	„ .	Ballynahinch Castle....	4·40	122
„ .	Montrose, Sunnyside...	2·11	103	„ .	Ahascragh, Clonbrock.	3·55	128
Aber .	Balmoral Castle Gdns..	1·73	75	*Rosc* .	Strokestown, C'node....	...	...
„ .	Logie Coldstone Sch....	2·00	80	*Mayo.*	Blacksod Point.....	1·70	73
„ .	Aberdeen Observatory.	1·52	65	„ .	Mallaranny	2·38	...
„ .	New Deer School House	1·49	68	„ .	Westport House.....	2·12	75
Moray	Gordon Castle.....	1·81	85	„ .	Delphi Lodge.....	4·72	78
„ .	Grantown-on-Spey	1·03	44	*Sligo* .	Markree Castle.....	1·66	61
Nairn.	Nairn	1·19	66	*Cavan.*	Crossdoney, Kevit Cas..	1·56	...
Inv's .	Ben Alder Lodge.....	3·26	...	*Ferm* .	Crom Castle.....	1·45	52
„ .	Kingussie, The Birches.	1·27	...	*Arm* .	Armagh Obsy.....	1·08	45
„ .	Loch Ness, Foyers	1·25	51	*Down.*	Fofanny Reservoir.....	1·94	...
„ .	Inverness, Culduthel R.	1·25	68	„ .	Seaforde	·93	73
„ .	Loch Quoich, Loan.....	4·05	...	„ .	Donaghadee, C. G. Stn.	·88	39
„ .	Glenquoich.....	...	...	*Antr* .	Belfast,Queen's Univ....	1·23	53
„ .	Arisaig House.....	2·81	81	„ .	Aldergrove Aerodrome.	·95	42
„ .	Glenleven, Corrour.....	...	...	„ .	Ballymena, Harryville.	2·19	77
„ .	Fort William, Glasdrum	...	...	*Lon* .	Garvagh, Moneydig....	1·59	...
„ .	Skye, Dunvegan.....	2·69	...	„ .	Londonderry, Creggan.	2·15	82
„ .	Barra, Skallary.....	2·99	...	*Tyr* .	Omagh, Edenfel.....	2·10	81
R&O .	Alness, Ardross Castle.	1·83	70	*Don* .	Malin Head.....	2·17	...
„ .	Ullapool	1·47	58	„ .	Dunkineely.....	...	...

Climatological Table for the British Empire, December, 1936

STATIONS.	PRESSURE.		TEMPERATURE.							Relative Humidity.	Mean Cloud Am'nt	PRECIPITATION.			BRIGHT SUNSHINE.	
			Absolute.		Mean Values.				Mean.							
	Mean of Day M.S.L.	Diff. from Normal.	Max.	Min.	Max.	Min.	½ Max. and Min.	Diff. from Normal	Wet Bulb.			Am'nt.	Diff. from Normal.	Days.	Hours per day.	Percentage of possible.
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0–10	in.	in.			
London, Kew Obsy.	1019·7	+ 6·0	55	28	46·8	37·9	42·3	+ 0·9	39·8	89	6·7	1·38	− 0·91	14	1·9	24
Gibraltar	1023·9	+ 3·6	62	45	57·6	50·7	54·1	...	49·7	80	5·8	2·69	...	12	...	...
Malta	1021·4	+ 5·2	65	45	60·7	52·3	56·5	− 1·4	51·3	74	6·6	3·33	− 0·38	13	4·8	50
St. Helena	1012·1	− 1·2	69	55	66·3	57·6	61·9	+ 0·2	58·7	90	8·9	1·65	+ 0·32	10	...	...
Freetown, Sierra Leone	1011·5	+ 2·3	89	72	86·2	75·5	80·9	...	75·4	80	3·4	0·48	− 0·94	3	...	...
Lagos, Nigeria	1010·5	+ 0·5	90	68	86·5	75·1	80·8	− 1·0	74·2	86	6·3	2·42	+ 1·61	3	6·5	55
Kaduna, Nigeria	1012·9	...	96	46	88·4	59·1	73·7	+ 0·4	58·5	61	1·5	1·33	+ 1·33	1	8·9	78
Zomba, Nyasaland	1008·8	+ 0·3	90	52	81·9	64·0	72·9	− 0·2	67·6	75	7·1	5·85	− 5·02	13	...	...
Salisbury, Rhodesia	1009·6	+ 0·7	88	51	81·0	58·7	69·9	+ 0·3	61·7	61	5·5	2·03	− 4·06	10	6·6	50
Cape Town	1014·0	− 0·3	103	52	76·7	59·0	67·9	0·0	59·9	62	3·4	1·19	+ 0·38	6	...	...
Johannesburg	1010·1	+ 0·4	87	47	78·7	57·0	67·9	+ 2·4	57·9	61	4·1	1·95	− 3·48	12	8·6	63
Mauritius	1012·6	− 1·4	88	67	83·7	71·6	77·6	− 0·7	73·9	74	6·4	13·84	+ 9·11	21	7·4	56
Calcutta, Alipore Obsy.	1014·5	− 1·2	83	52	79·0	59·6	69·3	+ 2·8	60·3	86	1·1	1·27	+ 1·03	1*	...	...
Bombay	1012·4	− 1·1	92	60	85·6	68·9	77·3	− 0·1	65·9	68	0·7	0·00	− 0·05	0*	...	...
Madras	1012·1	− 1·4	86	67	84·0	71·9	77·9	+ 1·2	72·9	83	6·8	1·94	− 3·41	3*	...	...
Colombo, Ceylon	1010·1	− 0·2	88	67	84·8	72·8	78·8	− 0·7	74·7	79	7·1	7·94	+ 2·82	16	6·1	52
Singapore	1009·0	− 0·7	88	72	85·3	74·5	79·9	0·0	76·6	82	6·9	10·62	+ 0·06	20	5·2	43
Hongkong	1018·5	− 1·2	81	53	70·5	60·7	65·6	+ 2·6	60·2	75	6·0	0·37	− 0·66	5	5·0	47
Sandakan	1008·4	...	90	73	86·7	75·2	80·9	+ 0·7	77·1	87	8·5	19·03	+ 0·39	20	...	...
Sydney, N.S.W.	1012·8	+ 0·9	94	59	77·6	65·8	71·7	+ 1·6	66·0	69	7·2	4·83	+ 1·97	18	6·2	44
Melbourne	1012·2	− 0·5	90	47	75·5	56·9	66·2	+ 1·4	60·5	71	8·2	2·65	+ 0·38	21	4·9	33
Adelaide	1012·5	− 0·7	101	47	81·0	59·9	70·5	− 0·6	61·2	50	7·1	3·42	+ 2·42	10	6·6	46
Perth, W. Australia	1018·0	+ 4·8	96	56	82·6	63·9	73·3	+ 2·5	63·0	54	4·5	1·36	+ 0·80	5	10·3	72
Coolgardie	1011·0	− 0·2	105	51	88·1	62·0	75·1	− 0·6	62·4	52	3·3	1·48	+ 0·79	8	...	...
Brisbane	1013·0	+ 1·0	95	63	84 9	68·4	76·7	+ 0·3	68·7	58	5·8	1·80	− 3·09	8	8·5	62
Hobart, Tasmania	1013·7	+ 4·0	86	45	66·1	53·0	59·5	− 0·7	55·1	67	8·3	4·30	+ 2·31	17	4·8	31
Wellington, N.Z.	1015·9	+ 3·7	72	42	63·8	51·0	57·4	− 2·8	54·5	72	6·3	4·43	+ 1·21	13	7·2	48
Suva, Fiji	1010·5	+ 1·9	88	67	84·5	73·7	79·1	+ 0·1	73·7	75	6·4	12·06	− 0·46	15	7·3	55
Apia, Samoa	1007·5	− 0·8	88	72	86·1	74·7	80·4	+ 1·1	76·7	79	6·3	11·38	− 2·51	21	5·9	46
Kingston, Jamaica	1013·4	− 0·6	89	65	86·1	68·6	77·3	− 0·4	67·0	86	2·2	1·12	− 0·47	9	6·3	57
Grenada, W.I.	1011·5	− 0·3	87	71	85	73	79	+ 0·8	73	74	5	6·80	− 0·40	19	...	...
Toronto	1021·6	+ 4·0	53	5	37·7	25·2	31·5	+ 4·4	...	...	7·5	3·37	+ 0·90	13	2·7	30
Winnipeg	1017·2	− 1·5	40	−26	17·5	1·9	9·7	+ 3·9	...	...	5·1	0·75	− 0·19	11	2·0	24
St. John, N.B.	1022·8	+ 8·8	49	3	36·7	18·9	27·8	+ 3·4	24·2	81	6·6	8·20	+ 4·03	16	2·9	33
Victoria, B.C.	1014·1	− 2·6	53	29	46·1	39·1	42·6	+ 1·5	40·1	84	8·1	8·35	+ 2·61	26	2·0	24

* For Indian stations a rain day is a day on which 0·1 in. or more rain has fallen.

STATIONS.	PRESSURE.		TEMPERATURE.							Relative Humidity.	Mean Cloud Am'nt	PRECIPITATION.			BRIGHT SUNSHINE.	
			Absolute.		Mean Values.				Mean.							
	Mean of Day M.S.L.	Diff. from Normal.	Max.	Min.	Max.	Min.	½ Max. and Min.	Diff. from Normal	Wet Bulb.			Am'nt.	Diff. from Normal.	Days.	Hours per day.	Percentage of possible.
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0–10	in.	in.			

Climatological Table for the British Empire, Year 1936

STATIONS.	PRESSURE. Mean of Day M.S.L.	PRESSURE. Diff. from Normal.	TEMPERATURE. Absolute. Max.	TEMPERATURE. Absolute. Min.	TEMPERATURE. Mean Values. Max.	TEMPERATURE. Mean Values. Min.	TEMPERATURE. Mean Values. ½ Max. and Min.	TEMPERATURE. Mean Values. Diff. from Normal.	TEMPERATURE. Mean. Wet Bulb.	Relative Humidity.	Mean Cloud Am'nt	PRECIPITATION. Am'nt.	PRECIPITATION. Diff. from Normal.	PRECIPITATION. Days.	BRIGHT SUNSHINE. Hours per day.	BRIGHT SUNSHINE. Percentage of possible.
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0–10	in.	in.			
London, Kew Obsy.	1013·7	− 1·7	85	22	56·6	44·3	50·5	+ 0·3	45·7	87	7·5	23·74	− 0·06	168	3·6	27
Gibraltar	1016·8	− 1·1	89	43	66·0	57·3	61·7	...	56·8	83	5·5	46·97	...	119	...	...
Malta	1015·2	− 0·2	96	41	69·9	60·7	65·3	− 0·8	59·7	75	4·6	17·01	− 2·85	79	8·2	67
St. Helena	1014·3	− 0·2	71	51	63·9	56·8	60·3	− 1·2	57·7	92	9·3	27·90	− 2·12	222	...	...
Freetown, Sierra Leone	1012·0	+ 2·3	95	67	85·3	73·5	79·4	...	75·2	83	6·6	144·40	− 12·83	190	...	...
Lagos, Nigeria	1011·6	+ 0·8	93	68	85·4	75·4	80·4	− 0·3	75·4	86	7·5	62·28	− 9·70	116	5·5	46
Kaduna, Nigeria	1009·9	...	101	46	89·2	65·8	77·5	+ 1·1	67·3	75	5·4	46·29	− 7·54	108	7·5	62
Zomba, Nyasaland	1012·6	+ 0·2	92	47	78·6	60·7	69·7	+ 0·3	65·1	75	6·0	52·19	− 2·35	121	...	...
Salisbury, Rhodesia	1015·2	+ 0·5	91	33	76·5	53·3	64·9	− 0·4	57·1	61	4·3	28·92	− 2·63	107	7·6	63
Cape Town	1018·0	+ 1·0	103	38	71·7	54·3	63·0	+ 0·7	55·0	76	4·3	20·17	− 4·87	95	...	...
Johannesburg	1016·1	+ 0·4	87	24	70·0	49·4	59·7	0·0	50·6	63	3·6	29·87	− 3·35	91	8·4	69
Mauritius	1016·0	− 0·1	90	52	80·9	67·7	74·3	+ 0·3	69·8	71	5·2	48·77	− 0·89	232	8·1	67
Calcutta, Alipore Obsy.	1007·4	− 0·2	107	50	88·2	71·8	80·0	+ 1·2	72·3	85	4·9	70·22	+ 5·90	99*	...	...
Bombay	1008·8	− 0·4	101	60	86·8	74·3	80·6	0·0	73·3	78	4·4	58·43	− 13·76	80*	...	...
Madras	1008·2	− 0·6	105	65	90·4	75·9	83·1	0·0	75·7	...	6·5	44·25	− 5·31	71*	...	...
Colombo, Ceylon	1010·2	+ 0·5	92	67	85·7	75·1	80·4	− 0·6	76·0	76	6·6	100·16	+ 20·03	177	6·9	57
Singapore	1009·4	− 0·1	92	71	86·0	75·7	80·8	− 0·1	77·1	81	6·9	85·51	− 9·61	211	5·7	47
Hongkong	1012·7	+ 0·2	92	43	77·2	67·9	72·6	+ 0·3	67·5	76	6·9	69·79	− 15·94	135	5·6	47
Sandakan	1009·2	...	92	72	87·7	75·1	81·4	+ 0·1	77·1	83	7·8	148·21	+ 23·42	189	...	...
Sydney, N.S.W.	1016·2	+ 0·3	100	41	71·1	55·9	63·5	+ 0·4	57·7	67	5·5	30·22	− 17·26	130	7·0	59
Melbourne	1016·1	− 0·2	106	33	67·9	49·6	58·8	+ 0·4	52·8	68	6·7	24·30	− 1·17	187	5·5	45
Adelaide	1017·4	+ 0·3	104	37	72·6	53·1	62·9	− 0·1	55·1	57	6·0	19·34	− 1·84	123	6·7	55
Perth, W. Australia	1017·0	+ 0·6	105	38	74·2	56·5	65·4	+ 1·2	56·5	60	5·1	30·64	− 3·73	118	8·0	66
Coolgardie	1015·7	− 0·2	109	30	77·8	52·9	65·4	+ 0·9	55·1	55	3·3	7·43	− 2·84	48	...	...
Brisbane	1015·9	0·0	99	40	78·1	60·1	69·1	+ 0·2	62·1	65	4·5	21·77	− 23·52	101	7·8	65
Hobart, Tasmania	1013·2	+ 0·7	92	32	61·7	46·8	54·3	− 0·1	48·2	64	6·3	19·60	− 4·19	177	5·8	48
Wellington, N.Z.	1014·5	− 0·2	79	33	59·7	48·2	54·0	− 1·4	51·1	76	6·9	56·80	+ 8·76	173	5·4	45
Suva, Fiji	1011·5	+ 0·2	94	63	83·2	72·3	77·8	+ 0·8	73·0	81	6·6	129·93	+ 12·79	236	5·9	49
Apia, Samoa	1009·6	− 0·7	89	65	85·1	74·3	79·7	+ 1·2	76·1	78	5·6	105·14	− 4·57	198	6·8	56
Kingston, Jamaica	1012·7	− 1·0	92	65	87·3	71·5	79·4	+ 0·1	70·5	83	3·6	36·34	+ 2·75	79	6·0	50
Grenada, W.I.	1011·3	− 0·9	90	70	85·4	72·8	79·1	+ 0·2	74	75	5	68·60	− 5·99	206	...	...
Toronto	1016·0	− 0·6	105	− 3	54·5	38·3	46·4	+ 1·2	...	...	6·3	24·69	− 6·60	116	5·7	47
Winnipeg	1016·4	+ 0·2	108	−43	44·3	22·9	33·6	− 1·0	...	...	4·9	15·41	− 4·77	9	5·8	47
St. John, N.B.	1014·3	− 0·3	85	−10	49·2	34·2	41·7	+ 0·5	38·1	81	6·8	47·87	− 0·21	160	4·8	39
Victoria, B.C.	1017·2	+ 0·5	82	9	55·5	44·1	49·8	+ 0·4	47·6	81	6·2	29·20	− 1·11	152	6·1	50
Addendum: St. Helena—October ...	1015·0	−0·3	65	52	59·7	53·8	56·7	−1·6	54·9	97	10·0	4·21	+2·90	27	...	

* For Indian stations a rain day is a day on which 0·1 in. or more rain has fallen.

(*Continued from p. 123*)

about the 15th and many landslips were also reported. Part of Fairbanks, Alaska, was under water on the 16th as the Tanana and Chena Rivers were blocked by loose ice. Dense fog was experienced off Nantucket on the 28th. In the United States temperature was mainly above normal in the western and Gulf States, below normal in the Ohio Valley and Lake Region and variable in the eastern States, while rainfall was in general below normal. (*The Times*, May 17th–29th, and *Washington, D.C., U.S. Dept. Agric., Weekly Weather and Crop Bulletin.*)

Daily Readings at Kew Observatory, May 1937

Date	Pressure, M.S.L. 13h.	Wind, Dir., Force 13h.	Temp. Min.	Temp. Max.	Rel. Hum. 13h.	Rain.	Sun.	Remarks. (see vol. 69, 1934, p. 1).
	mb.		°F.	°F	%	in.	hrs.	
1	1026·4	E.3	44	58	63	—	5·5	z 9h.
2	1020·8	NE.3	46	65	66	—	7·8	
3	1009·9	E.2	46	69	50	—	8·2	m till 9h.
4	1014·7	WSW.2	48	63	62	—	5·4	mw 7h.
5	1022·8	WNW.4	44	59	36	—	11·8	pr_0 7h.
6	1026·3	WSW.3	40	60	47	0·02	4·2	pr_0 16h., r 21h., 24h.
7	1022·4	W.3	51	66	63	0·22	5·4	r–r_0 0h.–5h.
8	1020·4	ENE.3	50	55	75	—	0·0	w early.
9	1010·9	E.3	45	52	95	0·18	0·0	r–r_0 5h.–19h.
10	1010·6	SSW.2	49	62	57	—	3·3	[15h.
11	1004·8	E.3	48	62	95	0·39	2·5	R 8h.–9h., r–r_0 11h.–
12	1006·6	NNE.3	42	58	73	0·25	0·3	pr 16h., r 18h.–24h.
13	1008·9	NW.2	48	55	81	0·07	0·1	r_0–r 0h.–5h.
14	1010·2	NE.2	43	58	68	—	0·5	Fe–f till 12h., r_0 15h.
15	1013·8	NNE.4	48	53	72	—	0·0	
16	1018·6	NNE.2	45	53	71	—	0·1	d_0 7h., w 21h.
17	1015·4	E.3	45	61	62	—	10·7	
18	1012·7	NE.4	42	56	67	trace	0·4	ir_0 16h.–24h.
19	1007·6	Calm	49	64	87	0·13	2·9	r_0–r 0h.–12h.
20	1007·4	S.2	45	66	62	0·05	6·2	r_0–r 22h.–24h.
21	1006·3	WSW.4	53	61	55	0·54	5·4	r_0–r 0h.–9h., pr_0 15h.
22	1016·5	S.4	46	58	87	0·01	0·4	pr_0–id_0 7h.–21h.
23	1020·5	S.4	55	71	62	0·04	8·0	r–r_0 23h.–24h.
24	1019·3	SW.3	55	74	63	0·01	12·7	r_0 0h.
25	1018·6	S.3	56	78	54	trace	11·8	pr_0 2h.–3h., l 22h.
26	1015·8	SE.2	59	73	60	0·22	3·9	TLR 1h.–4h., 15h.
27	1026·8	W.2	49	69	55	—	10·4	w early.
28	1026·5	S.2	49	75	49	—	13·5	w early.
29	1022·8	SW.3	56	80	50	—	10·9	
30	1019·8	W.3	56	74	62	—	7·9	w early.
31	1019·1	WSW.2	55	67	45	—	12·8	
*	1016·2	...	49	64	64	2·15	5·6	* Means or Totals.

General Rainfall for May, 1937

England and Wales ...	136	per cent of the average 1881–1915.
Scotland	78	
Ireland	80	
British Isles	107	

(37437) Wt. 20/31 1,125 6/37 Hw G.377/6